NAME:

Probability Worksheet

68 min
69 marks

1. Consider events A, B such that P $(A) \neq 0$, P $(A) \neq 1$, P (B) $\neq 0$, and P (B) $\neq 1$.

    In each of the situations (a), (b), (c) below state whether A and B are

    > mutually exclusive (M);
    > independent (I);
    > neither (N).

    (a)   P(A|B) = P(A)

    (b)   P(A ∩ B) = 0

    (c)   P(A ∩ B) = P(A)

Working:

Answers:

(a)   ....

(b)   ....

(c)   ....

(Total 6 marks)

2. Two fair dice are thrown and the number showing on each is noted. The sum of these two numbers is S. Find the probability that

    (a) S is less than 8;

    (2)

    (b)   at least one die shows a 3;

    (2)

    (c)   at least one die shows a 3, given that S is less than 8.

    (3)
    (Total 7 marks)

3. The following Venn diagram shows a sample space U and events A and B.

U A B

$n(U) = 36$, $n(A) = 11$, $n(B) = 6$ and $n(A \cup B)' = 21$.

(a) On the diagram, shade the region $(A \cup B)'$.

(b) Find

(i) $n(A \cap B)$;

(ii) $P(A \cap B)$.

(c) Explain why events A and B are not mutually exclusive.

Working:

Answers:

(b) (i) ....

(ii) ....

(c) ....

(Total 4 marks)

4. A bag contains 10 red balls, 10 green balls and 6 white balls. Two balls are drawn at random from the bag without replacement. What is the probability that they are of different colours?

Working:

Answer:

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(Total 4 marks)

5. In a survey of 200 people, 90 of whom were female, it was found that 60 people were unemployed, including 20 males.

(a) Using this information, complete the table below.

	Males	Females	Totals
Unemployed			
Employed			
Totals			200

(b) If a person is selected at random from this group of 200, find the probability that this person is

(i) an unemployed female;

(ii) a male, given that the person is employed.

Working:

Answers:

(b) (i) ....

(ii) ....

(Total 4 marks)

6. A painter has 12 tins of paint. Seven tins are red and five tins are yellow. Two tins are chosen at random. Calculate the probability that both tins are the same colour.
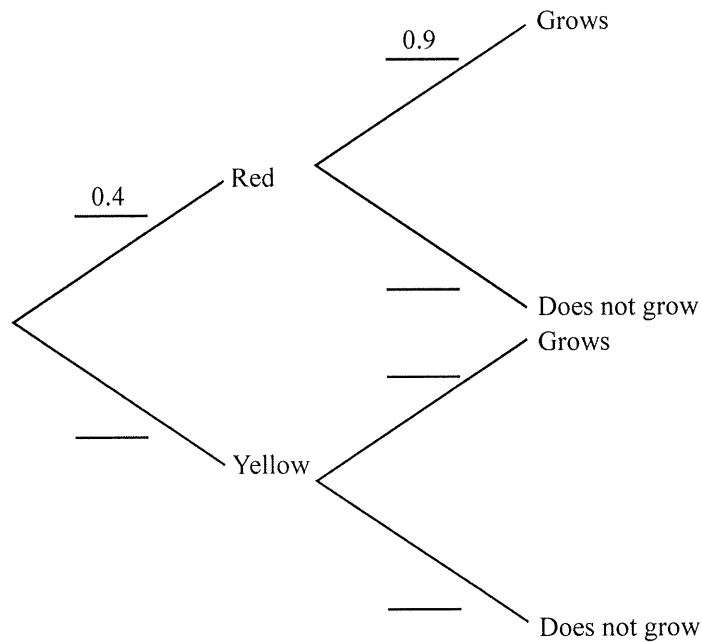
Working:

Answer:

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(Total 6 marks)

7. A packet of seeds contains 40% red seeds and 60% yellow seeds. The probability that a red seed grows is 0.9, and that a yellow seed grows is 0.8. A seed is chosen at random from the packet.

    (a) Complete the probability tree diagram below.

(3)

    (b) (i)   Calculate the probability that the chosen seed is red and grows.

         (ii)   Calculate the probability that the chosen seed grows.

         (iii) Given that the seed grows, calculate the probability that it is red.

(7)
(Total 10 marks)

8. Consider the events A and B, where $P(A) = \dfrac{2}{5}$, $P(B') = \dfrac{1}{4}$ and $P(A \cup B) = \dfrac{7}{8}$.

(a) Write down $P(B)$.

(b) Find $P(A \cap B)$.

(c) Find $P(A \mid B)$.

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(Total 6 marks)

9. The Venn diagram below shows information about 120 students in a school. Of these, 40 study Chinese (*C*), 35 study Japanese (*J*), and 30 study Spanish (*S*).

A student is chosen at random from the group. Find the probability that the student

(a) studies exactly two of these languages;

(1)

(b) studies only Japanese;

(2)

(c) does not study any of these languages.

(3)

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(Total 6 marks)

10. Two restaurants, *Center* and *New*, sell fish rolls and salads.

Let F be the event a customer chooses a fish roll.
Let S be the event a customer chooses a salad.
Let N be the event a customer chooses neither a fish roll nor a salad.

In the *Center* restaurant $P(F) = 0.31$, $P(S) = 0.62$, $P(N) = 0.14$.

(a)   Show that $P(F \cap S) = 0.07$.

                                                                                    (3)

(b)   Given that a customer chooses a salad, find the probability the customer also chooses a fish roll.

                                                                                    (3)

(c)   Are F and S independent events? Justify your answer.

                                                                                    (3)

At *New* restaurant, $P(N) = 0.14$. Twice as many customers choose a salad as choose a fish roll. Choosing a fish roll is **independent** of choosing a salad.

(d)   Find the probability that a fish roll is chosen.

                                                                                    (7)
                                                                        (Total 16 marks)